**Data Manipulation using Dairy Production Performance Dataset**

Instructions: The teams as mentioned in last class (cowboys, data gurus, uno) and figure out solutions for the following questions. **Have cleanly annotated data manipulation work in Github submitted along with your detailed description about observations in a word document. This is your classwork as well as assignment 2.**

**Prologue**: A simulated dataset of body weight, lactation curves, dry matter intakes, milk component curves and culling risks from an average US dairy herd is provided**.** Use this dataset to:

1. Put all the Colab code from Module 2 on Github, using visual studio
2. Clearly explain how mathematical models were used to simulate heifer body weight (BW), dry matter intake (DMI), lactating and pregnant cows body weight. Also explain the mathematical logic behind simulating lactation curves of cows, protein curves of cows, somatic cell count curves of cows, and as well as daily live and death culling risks of cows. Read the paper <https://www.sciencedirect.com/science/article/pii/S0022030219309063?via%3Dihub>

And explain how the above mentioned mathematical models for body weight, lactation curves were used for simulating mastitis economics.

1. Use mathematical equations given in the excel database to simulate BW of heifers, lactation 1 and 2+, DMI (Heifers, lactation 1, 2+), Milk Component curves (Heifers, Lactation 1, 2+), and daily culling probability for 365 days, using python in visual studio.
2. Create a data frame integrating all these, find cumulative milk yield, protein yield of lactation 1 and 2+ cows.
3. Use slicing function to plot milk, fat, and protein production curves of lactation 1, and 2+ in one plot. Clearly explain the biological dynamics of the lactation curves.
4. Do all these in Visual studio on separate laptops. Then commit the code to a common Github project for your team.

**Total Points = 10**